

# SPM27C64H<sub>15/20</sub>

## CMOS 64K-BIT UV EPROM/OT PROM

- Access Time 150ns/200ns
- 8,192 Words × 8 Bits Asynchronous
- Low Supply Current

**DESCRIPTION**

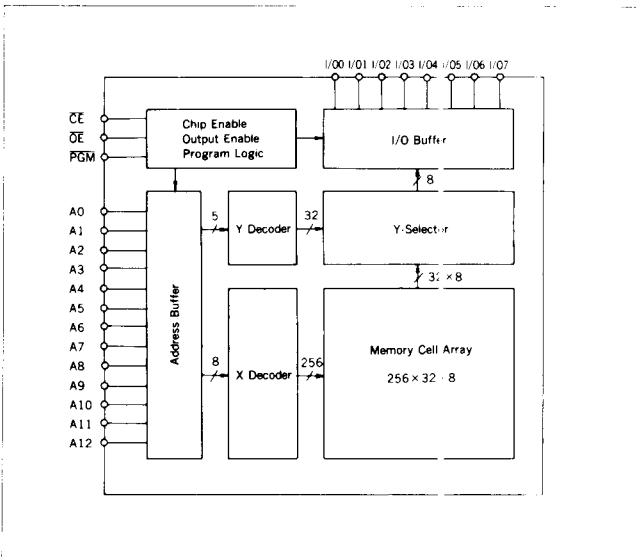
The CMOS EPROM SPM27C64H<sub>15/20</sub> is an 8,192 words × 8 bits erasable and electrically programmable ROM. The peripheral CMOS circuit realizes High-speed and Low supply current. The SPM27C64H<sub>15/20</sub> is packaged in a 28-pin CERDIP with a transparent lid. The transparent lid allows the memory content to be erased with ultraviolet light, whereby a new pattern can then be written into the device. The SPM27C64C<sub>15/20</sub>\* is a one time programmable ROM, packaged in a 28-pin plastic dual-in-line package. Its functions and characteristics are same as the SPM27C64H<sub>15/20</sub> except that the SPM27C64C<sub>15/20</sub>\* allows one time writing only.

**FEATURES**

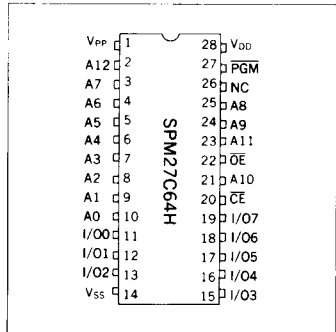
- Fast access time ..... SPM27C64H<sub>15</sub> 150ns (Max)  
SPM27C64H<sub>20</sub> 200ns (Max)
- Low supply current ..... Standby : 1 μA (Typ)  
Operation : 30mA (Max)
- Simple programming ..... Program voltage +21V  
Program with one 50ms pulse
- Completely static ..... No clock required
- Single power supply ..... 5V ±10%
- TTL compatible inputs and outputs
- 3-state output with wired-OR capability
- Package ..... SPM27C64H<sub>15/20</sub> 28-pin CERDIP with transparent lid  
SPM27C64C<sub>15/20</sub>\* (OT PROM) 28-pin DIP (plastic)

\* Under development

**BLOCK DIAGRAM**



**PIN CONFIGURATION**



**PIN DESCRIPTION**

A0 to A12	Address Input
CE	Chip Enable
OE	Output Enable
PGM	Program Input
I/00 to I/07	Data I/O
V <sub>PP</sub>	Power Supply for Program
V <sub>DD</sub>	Power Supply (5V)
V <sub>SS</sub>	Power Supply (0V)
NC	No connection

### ■SPM27C64H SERIES

Model	Access time	Function	Package
SPM27C64H <sub>15</sub>	150ns	UV EPROM	28-pin CERDIP with transparent lid
SPM27C64H <sub>20</sub>	200ns		
SPM27C64C <sub>15</sub>	150ns	One Time PROM	28-pin DIP (plastic)
SPM27C64C <sub>20</sub>	200ns		

### ■ABSOLUTE MAXIMUM RATINGS

(V<sub>SS</sub> = 0V)

Parameter	Symbol	Ratings	Unit
Supply voltage*1	V <sub>DD</sub>	-0.6 to 7.0	V
Supply voltage for programming*1	V <sub>PP</sub>	-0.6 to 22	V
Input voltage*1	V <sub>I</sub>	-0.6 to 7.0	V
Output voltage*1	V <sub>O</sub>	-0.6 to 7.0	V
Output current	I <sub>O</sub>	10	mA
Operating temperature	T <sub>opr</sub>	0 to 70	°C
Storage temperature	T <sub>stg</sub>	-65 to 125	°C

\*1 With respect to V<sub>SS</sub>

### ■ELECTRICAL CHARACTERISTICS

#### Read Mode

#### ●DC Electrical Characteristics

(V<sub>DD</sub> = 5V ± 10%, V<sub>SS</sub> = 0V, V<sub>PP</sub> = V<sub>DD</sub> ± 0.6V, Ta = 0 to 70°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
High level input voltage	V <sub>IH</sub>		2.2	—	V <sub>DD</sub> + 1.0	V
Low level input voltage	V <sub>IL</sub>		-0.6	—	0.8	V
Input leakage current	I <sub>LI</sub>	0 ≤ V <sub>I</sub> ≤ V <sub>DD</sub>	-2.0	—	2.0	μA
Standby supply current	I <sub>DDs</sub>	CE = V <sub>DD</sub> ± 0.3V	—	1	100	μA
Operating supply current	I <sub>DDO</sub>	Output open	—	—	30	mA
Programming supply current	I <sub>PP</sub>		—	—	100	μA
Output leakage current	I <sub>LO</sub>	0 ≤ V <sub>O</sub> ≤ V <sub>DD</sub>	-10.0	—	10.0	μA
High level output voltage	V <sub>OH</sub>	I <sub>OH</sub> = -400μA	2.4	—	—	V
Low level output voltage	V <sub>OL</sub>	I <sub>OL</sub> = 2.1mA	—	—	0.45	V

#### ●Terminal Capacitance

(f = 1.0MHz, Ta = 25°C)

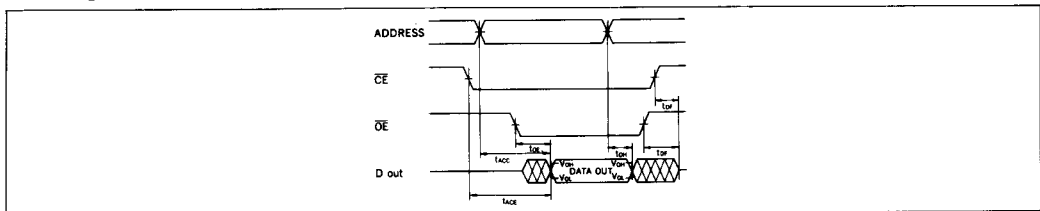
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C <sub>I</sub>	V <sub>I</sub> = 0V	—	—	6	pF
Output Capacitance	C <sub>O</sub>	V <sub>O</sub> = 0V	—	—	12	pF

#### ●AC Electrical Characteristics

(V<sub>DD</sub> = 5V ± 10%, V<sub>SS</sub> = 0V, V<sub>PP</sub> = V<sub>DD</sub> ± 0.6V, Ta = 0 to 70°C)

Parameter	Symbol	Conditions	SPM27C64H <sub>15</sub>		SPM27C64H <sub>20</sub>		Unit
			Min	Max	Min	Max	
Address access time	t <sub>ACC</sub>	CL = 1TTL + 100pF	—	150	—	200	ns
Chip enable access time	t <sub>ACE</sub>	V <sub>IH</sub> = 2.2V	—	150	—	200	ns
Output enable access time	t <sub>OE</sub>	V <sub>IL</sub> = 0.8V	—	60	—	70	ns
Output floating time	t <sub>DF</sub>	V <sub>OH</sub> = 1.5V	—	50	—	60	ns
Output hold time	t <sub>OH</sub>	V <sub>OL</sub> = 1.5V	0	—	0	—	ns
		t <sub>r</sub> = t <sub>f</sub> = 20ns					

#### ●Timing Chart



## Programming Mode

### ●DC Electrical Characteristics

( $V_{DD}=5V \pm 5\%$ ,  $V_{SS}=0V$ ,  $V_{PP}=21 \pm 0.5V$ ,  $T_a=25 \pm 5^\circ C$ )

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
High level input voltage	$V_{IH}$		2.2	—	$V_{DD}+0.3$	V
Low level input voltage	$V_{IL}$		-0.1	—	0.8	V
Input leakage current	$I_{LI}$	$V_I=5.25V/0.45V$	-2.0	—	2.0	$\mu A$
$V_{DD}$ supply current	$I_{DDO}$		—	—	30	mA
$V_{PP}$ supply current	$I_{PP}$	$\overline{CE}=PGM=V_{IL}$	—	—	30	mA
High level output voltage	$V_{OH}$	$I_{OH}=-400\mu A$	2.4	—	—	V
Low level output voltage	$V_{OL}$	$I_{OL}=2.1mA$	—	—	0.45	V

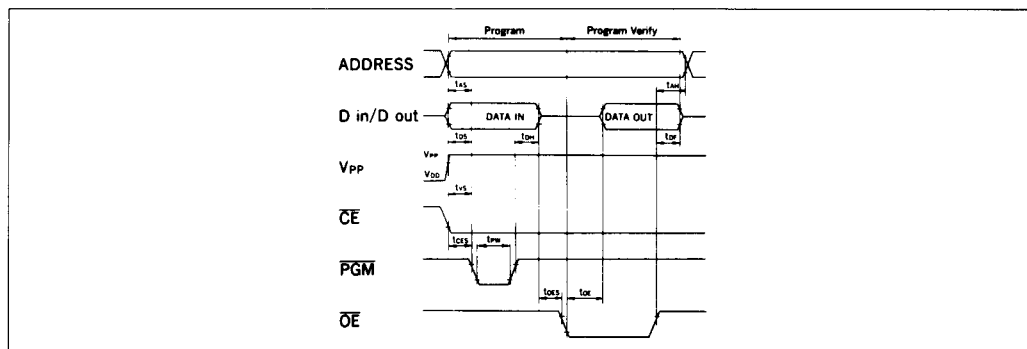
### ●AC Electrical Characteristics

( $V_{DD}=5V \pm 5\%$ ,  $V_{SS}=0V$ ,  $V_{PP}=21 \pm 0.5V$ ,  $T_a=25 \pm 5^\circ C$ )

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Address setup time	$t_{AS}$		2	—	—	$\mu s$
Chip enable setup time	$t_{CES}$		2	—	—	$\mu s$
Output enable setup time	$t_{OES}$		2	—	—	$\mu s$
Data setup time	$t_{DS}$		2	—	—	$\mu s$
Address hold time	$t_{AH}$		0	—	—	$\mu s$
Data hold time	$t_{DH}$		2	—	—	$\mu s$
Output floating	$t_{DF}$		0	—	130	ns
Output enable access time	$t_{OE}$		—	—	150	ns
$V_{PP}$ setup time	$t_{VS}$		2	—	—	$\mu s$
PGM pulse width during programming	$t_{PW}$		25	50	55	ms

\* $t_{DF}$  defines the time at which the output achieves the open circuit condition and is not referenced to output voltage levels.

### ●Timing Chart



## High Performance Programming Mode

### ●DC Electrical Characteristics

( $V_{DD}=6 \pm 0.25V$ ,  $V_{SS}=0V$ ,  $V_{PP}=21 \pm 0.5V$ ,  $T_a=25 \pm 5^\circ C$ )

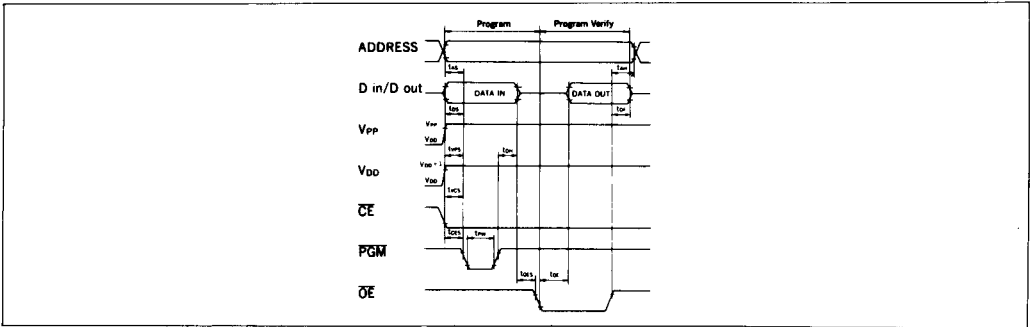
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
High level input voltage	$V_{IH}$		2.2	—	$V_{DD}+0.3$	V
Low level input voltage	$V_{IL}$		-0.1	—	0.8	V
Input leakage	$I_{LI}$	$V_I=5.25V/0.45V$	-2.0	—	2.0	$\mu A$
Operating supply current	$I_{DDO}$		—	—	30	mA
Programming supply current	$I_{PP}$		—	—	30	mA
High level output voltage	$V_{OH}$	$I_{OH}=-400\mu A$	2.4	—	—	V
Low level output voltage	$V_{OL}$	$I_{OL}=2.1mA$	—	—	0.45	V

●AC Electrical Characteristics

( $V_{DD} = 6 \pm 0.25V$ ,  $V_{SS} = 0V$ ,  $V_{PP} = 21 \pm 0.5V$ ,  $T_a = 25 \pm 5^\circ C$ )

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Address setup time	$t_{AS}$		2	—	—	$\mu S$
Chip enable setup time	$t_{CES}$		2	—	—	$\mu S$
Output enable setup time	$t_{OES}$		2	—	—	$\mu S$
Data setup time	$t_{DS}$		2	—	—	$\mu S$
Address hold time	$t_{AH}$		0	—	—	$\mu S$
Data hold time	$t_{DH}$		2	—	—	$\mu S$
Output floating	$t_{DF}$		0	—	130	ns
Output enable access time	$t_{OE}$		—	—	150	ns
$V_{PP}$ setup time	$t_{VPS}$		2	—	—	$\mu S$
$V_{DD}$ setup time	$t_{VCS}$		2	—	—	$\mu S$
PGM initial pulse width	$t_{PW}$		0.95	1.0	1.05	ms
PGM overprogram pulse width	$t_{OPW}$		3.8	—	63	ms

●Timing Chart



■ERASE

Erasure of SPM27C64H15/20 is performed by exposure to ultraviolet light of 2737 Å and all the output data are changed to "1" after this erasure procedure. The minimum integrated dose (i.e. UV intensity x exposure time) for erasure is 15W. sec/cm<sup>2</sup>

■FUNCTIONS

●Truth Table

Mode	Pin name	Address input A0 to A12	Data I/O I/O0 to I/O7	$\overline{CE}$	$\overline{OE}$	$\overline{PGM}$	$V_{DD}$	$V_{PP}$
Read		Stable	Output data	L	L	H	$V_{DD}$	$V_{DD}$
Output disable		Stable	Hi-Z	L	H	X	$V_{DD}$	$V_{DD}$
					X	L		
Standby		X	Hi-Z	H	X	X	$V_{DD}$	$V_{DD}$
Programming		Stable	Input data	L	X	L	$V_{DD}$	$V_{PP}$
Program verify		Stable	Output data	L	L	H	$V_{DD}$	$V_{PP}$
Program inhibit		X	Hi-Z	H	X	X	$V_{DD}$	$V_{PP}$

X: "H" or "L"

●Reading data

Data is able to be read by setting addresses during holding  $\overline{CE} = "L"$ ,  $\overline{OE} = "L"$  and  $\overline{PGM} = "H"$ .

●Output disable

Data I/O terminals are Hi-Z when  $\overline{OE} = "H"$  or  $\overline{PGM} = "L"$

